

36. A process for production of clavulanic acid or a salt thereof comprising fermentation of a clavulanic acid-producing species of Streptomyces in a fermentation broth containing sources of assimilable carbon, nitrogen, and phosphorus, wherein at a starting stage of fermentation the concentration of phosphorus is less than $0.15\% \text{ w/v}$; ^{$1.5 \text{ g/L} = 1500 \text{ mg/L}$} and, after the starting stage of fermentation and during a growth phase of the fermentation, adding a further source of assimilable phosphorus to maintain the concentration of phosphorus between 0.0015% and 0.15%, and subsequently isolating the clavulanic acid or a salt thereof from the fermentation broth.

B¹ 2 37. A process as claimed in Claim ~~36~~¹ wherein the concentration of assimilable phosphorus is allowed to decrease after cessation of the growth phase.

3 38. A process as claimed in Claim ~~36~~¹, wherein the concentration of assimilable phosphorus is allowed to decrease after a fermentation time of 40 hours.

4 39. A process as claimed in Claim ~~36~~¹ wherein a further source of assimilable phosphorus is to maintain the concentration of phosphorus between 0.0015% and 0.15% during the growth phase up to a fermentation time of 40 hours.

5 40. A process as claimed in Claim ~~36~~⁴ wherein the concentration of phosphorus is between 0.002% and 0.15%.

6 41. A process as claimed in Claim ~~36~~⁴ wherein the concentration of phosphorus at the starting stage of fermentation is about 0.008%. ^{20 mg/L 1500 mg/L}

$= 80 \text{ mg/L}$

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42. A process as claimed in Claim ~~41~~⁶, wherein no source of assimilable phosphorus is added after a fermentation time of 40 hours.

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43. A process as claimed in Claim ~~36~~¹, wherein ammonia is not the sole source of assimilable nitrogen.

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44. A process as claimed in Claim ~~43~~⁸, wherein the source of assimilable nitrogen does not include ammonia.

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45. A process as claimed in Claim ~~36~~¹, wherein the source of assimilable phosphorus is sodium phosphate, potassium phosphate, sodium dihydrogen phosphate, potassium dihydrogen phosphate, disodium hydrogen phosphate, dipotassium hydrogen phosphate, or a mixture thereof.

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46. A process as claimed in Claim ~~45~~¹⁰, wherein the source of assimilable phosphorus is sodium dihydrogen phosphate.

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47. A process as claimed in Claim ~~36~~¹, wherein the microorganism is *Streptomyces clavuligerus*, *Streptomyces jumonjinensis*, *Streptomyces katsurahamanus*, or *Streptomyces* sp. P6621.

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48. A process as claimed in Claim ~~36~~¹, wherein the fermentation is a fed batch fermentation, with intermittent or continuous addition of the source of assimilable phosphorus.

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49. A process as claimed in Claim ~~36~~¹, wherein the source of assimilable carbon is selected from the group consisting of glycerol trioleate, glycerol, and corn starch, and the source of assimilable carbon is optionally added during the growth phase of the fermentation.

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50. A process as claimed in Claim ¹⁴~~49~~, wherein the concentration of carbon is between 1.5% and 7.5%.

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51. A process as claimed in Claim ¹~~36~~, wherein the source of assimilable nitrogen includes soy bean flour or ammonium sulfate, and the source of assimilable nitrogen is present in the fermentation broth at the starting stage of the fermentation and is added during the growth phase of the fermentation.

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52. A process as claimed in Claim ¹⁶~~51~~, wherein the concentration of nitrogen is between 0.5% and 15%.

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53. A process as claimed in Claim ¹~~36~~, wherein the volume of the fermentation broth is greater than 10^4 liters.

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54. A process as claimed in Claim ¹⁸~~53~~, wherein the volume of the fermentation broth is 6×10^4 liters.

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55. A fed batch fermentation process for the production of clavulanic acid or a salt thereof, comprising:

- (a) fermentation of a clavulanic acid-producing species of Streptomyces in a fermentation broth containing sources of assimilable carbon, nitrogen, and phosphorus,
 - (b) after the starting stage of fermentation and during a growth phase of the fermentation, adding further sources of assimilable carbon and nitrogen and adding a further source of assimilable phosphorus to maintain the concentration of phosphorus between 0.0015% and 0.15%, and
 - (c) subsequently isolating the clavulanic acid or a salt thereof from the fermentation broth.
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